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Using Women's Health Research to Develop Women Leaders in Academic Health Sciences: The National Centers of Excellence in Women's Health

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ABSTRACT

While the number of women entering U.S. medical schools has risen substantially in the past 25 years, the number of women in leadership positions in academic medicine is disproportionately small. The traditional pathway to academic leadership is through research. Women's health research is an ideal venue to fill the pipeline with talented women physicians and scientists who may become academic leaders in positions where they can promote positive change in women's health as well as mentor other women. The Office on Women's Health (OWH) in the U.S. Department of Health and Human Services has contracted with 18 academic medical centers to develop National Centers of Excellence in Women's Health. Emphasizing the integral link between women's health and women leaders, each of the Centers of Excellence must develop a leadership plan for women in academic medicine as part of the contract requirements. This paper describes the training programs in women's health research that have developed at five of the academic medical centers: the University of Wisconsin, Magee Women's Hospital, the University of Maryland, Medical College of Pennsylvania Hahnemann University, and the University of Illinois at Chicago. We discuss some of the challenges faced for both initiation and future viability of these programs as well as criteria by which these programs will be evaluated for success.

INTRODUCTION

WOMEN HAVE BEEN ENTERING MEDICAL SCHOOLS at increasing rates since the mid-1970s and have accounted for approximately 40% of medical school class sizes nationally for the past 6 years.[1] However, the number of women in leadership positions is disproportionately small.[2,3] The reasons for women dropping out of paths that would enable them to become leaders in academic medicine are complex, but among them are feelings of isolation, lack of role models, lack of

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Since this manuscript was submitted, University of Maryland is no longer a National Center of Excellence in Women's Health.

formal and informal mentorship, an environment perceived as denigrating to women, frank gender discrimination, and a lack of institutional support for family issues that continue to fall predominantly on women.[4–11]

The traditional pathway to academic leadership in medical schools is through research. The clear minority of women investigators in biomedical research has been acknowledged as a problem requiring attention by the National Science Foundation,[12] the National Institutes of Health (NIH),[13] the Association of American Medical Colleges,[14] and the Association of Professors of Medicine.[15] The Council on Graduate Medical Education in its report on Women in Medicine[16] and the NIH Office on Research in Women's Health (ORWH)[13] highlighted the importance to women's health and healthcare of bringing more women into positions of leadership in academic medicine. In acknowledgement of the integral relationship between women's health and women researchers, the ORWH specifically cites the encouragement of more women investigators in biomedical and behavioral research as one of its three-pronged missions. The U.S. Department of Health and Human Services (DHHS) Office on Women's Health (OWH) not only recognized this need but also charged the National Centers of Excellence (CoEs) in Women's Health to address this concern as a primary component of the CoE contract with each academic medical center.[17]

Evidence supporting the link between women leaders in academic health sciences and women's health includes the historical observation that most major advances in women's health have been driven by women leaders, frequently those in academics.[18,19] Furthermore, women's health research draws predominantly women investigators, as is evident from the gender composition of fellows in women's health training programs, attendees and presenters at clinical and scientific symposia on women's health,[20] and principal investigators on proposals submitted to the NIH for research on diseases that occur predominantly or uniquely in women.[16] This relationship between women's health and women leadership in academic medicine and other health science fields is underscored by the fact that the directors of 13 of the current 15 CoEs are women.

Professional isolation is often cited as detrimental to women's advancement in academic medicine, particularly for women who are the first or one of a very few women in a male-dominated field.[4,11,21] Because women's health is intrinsically interdisciplinary, it can provide a framework for women to work together across traditional academic disciplines. By drawing these women investigators together for an activity that is valued in an academic setting (i.e., one that may lead to extramural grant support), women's health research can serve as a mechanism to reduce feelings of isolation, augment mentoring, and provide role modeling for women trainees in ways their male colleagues simply cannot.

Women's health research, therefore, is an opportune field in which to nurture the academic careers of women. It is an ideal venue to fill the pipeline with talented women who may become academic leaders in positions where they can promote positive change as well as mentor other women.

The OWH has taken a proactive approach to the development of women leaders in academic medicine through its CoE project. One of the contract requirements for each CoE is the development of a leadership plan for women in academic medicine, which some CoEs have broadened to include other academic health sciences. This article describes the training programs in women's health research that have been developed at five of the academic medical centers awarded National CoEs: the University of Wisconsin, Magee-Women's Hospital, the University of Maryland, Medical College of Pennsylvania (MCP)-Hahnemann University, and the University of Illinois at Chicago (UIC). Each site has drawn on local strengths and has targeted different levels of trainees. The programs are at different stages of development. One program focuses on young adult women, one on women of reproductive age, and one on postreproductive and older adult women. The other two emphasize research across the life span. At all sites, a multidisciplinary or interdisciplinary theme is prominent. Table 1 is a summary of these five training models. Some of the challenges faced across centers for both initiation and future viability of these programs are discussed, as well as some of the criteria by which these programs will be evaluated for success in the coming years.

PROGRAM DESCRIPTIONS

University of Wisconsin

At the University of Wisconsin, a 2-year Women's Health Fellowship was developed with

Table 1. Models of Training at Five National Centers of Excellence in Women's Health

	University of Wisconsin	*Magee-Women's Hospital*	*University of Maryland*	*MCP-Hahnemann*	*University of Illinois at Chicago*
Level of trainee	ABIM research pathway resident; postresidency M.D.s, postdoctoral Ph.D.s	Predoctoral Ph.D.s and medical students	Postresidency M.D.s, postdoctoral Ph.D.s	Medical students	Research novice faculty
Source of funding	DVA, NIA	NICHD, foundation	Corporate gifts, foundation	Institutional	NIH (proposed)
Length of training	2–5 years	2–5 years	2–3 years	Part-time: 1–2 years	2–5 years
Research emphasis	Basic, clinical, or epidemiological research on postreproductive and older women	Combined epidemiology and basic science research on reproductive age women	Women across the life span	Young adult women	Biological, biobehavioral, or behavioral research on women across the life span

Abbreviations: ABIM, American Board of Internal Medicine; DVA, Department of Veterans Affairs; NIA, National Institute on Aging; NICHD, National Institute of Child Health and Human Development; NIH, National Institutes of Health.

funding from the Department of Veterans Affairs, with the goal of training academic leaders in women's health. This fellowship preceded the CoE designation by several years, and it has been integrated into the CoE. In developing this fellowship, the Wisconsin CoE brought together women's health researchers and clinicians across a number of clinical departments and academic units. Within the scope of the 2-year fellowship, clinical service is kept to a minimum, and fellows are encouraged to complete a master's degree in population health with a focus on either epidemiology or health services research. Because 2 years is an insufficient training period to ensure a successful academic career, the CoE secured funding for a Women's Health and Aging: Research and Leadership Training Grant. This National Research Service Award (NRSA T32) from the National Institute on Aging supports additional years of training. The program provides funding for both postdoctoral physician and Ph.D. scientists to work with faculty clustered into two themes, the biology of menopause and postmenopausal diseases or clinical and epidemiological research in mid- to late life aging women. In addition to the 16 research faculty mentors available to trainees, 4 senior women faculty comprise a leadership core. These faculty provide additional mentoring, coaching, and advising to help ensure success of the trainees. The University of Wisconsin built into this training grant the possibility of trainees entering the American Board of Internal Medicine Research Pathway in Women's Health, whereby a resident can become board eligible and obtain research training over a 5-year period of training.

Magee-Women's Hospital

An Epidemiology and Basic Science Training Model is now available through a collaboration between the existing Epidemiology of Women's Health Program at the University of Pittsburgh Graduate School of Public Health and the recently developed, basic science research component established through the Magee-Women's Hospital CoE. This partnership is designed to enhance the training of epidemiology students in the conduct of scientific studies pertinent to women's health. While students take required courses for an epidemiology degree, they gain additional credits as graduate student researchers at the Magee-Women's Research Institute. The dual mentorship provides a team of coequal mentors, a basic scientist and an epidemiologist. At the conclusion of this unique program, students will be skilled in the initiation and conduct of major clinical studies, particularly those intended to evaluate risks, interventions, and outcomes associated with health issues pertinent to women.

University of Maryland

The University of Maryland CoE offers a Mentoring Team Postdoctoral Fellowship Model, also using teams of two coequal mentors from different academic departments, to produce a new

training model. Because women's health is intrinsically interdisciplinary, it lends itself to such a training model. Traditional training models often prepare trainees for careers that are similar to those of their mentors, with research projects chosen to fit within the area of the mentor's expertise. When it is time for trainees to begin an independent career, a critical issue often is how to differentiate themselves from their mentor and find an area of specialization that is uniquely their own. Some mentors may give careful thought at the outset to providing trainees with a unique niche they can consider their own at the end of their training experience, but other mentors are not so thoughtful. Trainees may find themselves faced with a stark choice when submitting their first research proposal for funding as independent investigators—to remain in the mentors' field of expertise as direct (and unequal) competitors or to move into a new area of concentration where they lack a track record of productivity. The University of Maryland's new model for postdoctoral fellowship training addresses these problems and produces investigators with unique areas of expertise that do not mirror that of senior mentors. At the same time, the training mechanism encourages the mentors to expand their own horizons. Key to the success of this program is the willingness on the part of the mentors to take risks and a significant level of maturity on the part of the trainees, who must take an exceptional amount of responsibility for the planning and progress of the research.

MCP-Hahnemann University

The training model at MCP-Hahnemann University CoE centers on medical students, providing them experiences in clinical research from the beginning of their training. The hope is that their interest will grow during their medical training and continue through the rest of their careers as physicians. The medical students' clinical research experiences were designed as active processes. At the inception of the new program, several seminars were presented to first-year and second-year women medical students. Following these seminars, 15 students became part of a women's health research group. The objectives of this group were threefold: to identify gaps in the current women's health literature, to design a clinical study to address one or more areas, and to implement the study using medical students as both investigators and subjects. The student group met biweekly for 3 months, presented topic areas for discussion, selected a few for further exploration, defined the basic study questions, and then developed the study design. Students, with the guidance of faculty mentors, completed the human subjects protocol, made the necessary revisions, trained student investigators for the study, and organized meetings. The students learned many basic research skills, including how to maintain a subject databook, perform assays, recruit subjects, and analyze data. The plan is to continue the program largely through the efforts of the second-year students who became involved as first-year students. The second-year students recruit a new group of first-year students into the process to continue the study. The second-year students for 1999–2000 revised the protocol and are taking the lead as recruiters and investigators.

University of Illinois at Chicago

The UIC CoE has proposed a generative clinical scholars training program in women's health science for junior faculty members (from multiple health sciences disciplines) that optimizes their success in developing a substantive and sustained research program. The program has three content themes that capitalize on the strengths of senior scientists at UIC and a methods focus to promote triangulation of scientific methodologies from biological and behavioral science. This career development program is meant to (1) promote scientific expertise of novice faculty by blending or spanning the boundaries of traditional scientific disciplines, (2) foster the development of a mentoring and peer networking infrastructure to enhance success of faculty in research, (3) promote collaborative women's health research, and (4) develop scientists who are better able to mentor students in women's health science.

Potential mentors have been designated related to three specific areas of science, including (1) Life-Threatening and Life Quality-Threatening Conditions in Women, (2) Reproduction, Ovarian Hormones, Pharmaceuticals, and Botanicals in Women's Health, and (3) Women's Health Risk Reduction-Prevention Research. Within this plan, an Academy of Women's Health Science will be formed with selected scholars and senior scientists dedicated to advancing collaborative

research and mentoring the next generation of women's health clinical scientists. The novel features of the Academy include (1) alignment with the research core of the UIC CoE, (2) mentors and scholars who represent a variety of health sciences disciplinary backgrounds, (3) strong mentor teams that include gender-related methodologists across basic biological, behavioral, and systems-level science, (4) strong peer networking, and (5) a multidisciplinary curriculum for learning skills in conducting scientific investigations.

CHALLENGES

The CoE directors meet biannually and have at least one conference call annually, forming a unique network of academic leaders in women's health who are given the same charge. The challenges that were identified in these discussions are necessarily descriptive and reflect the opinions of individual directors. However, these directors were chosen from a national pool of applicants for their experience and knowledge in women's health within academic medical centers, and this alone lends validity to their observations. The major challenges identified in developing training programs for women's health research have been (1) acquiring salary support for advanced trainees, (2) obtaining administrative support, (3) securing the commitment of mentors for an interdisciplinary effort often outside their department, and (4) assuring the effectiveness of cross-disciplinary mentors.

Salary support for advanced trainees

The CoE contracts provide salary support for key individuals in academic medical centers but do not provide funds for carrying out the contract requirements. Therefore, the first task of each center has been to assess local strengths and seek immediate and longer-term funding to implement the contract requirements. Potential funding sources include the various institutes of the NIH, the Department of Veterans Affairs, foundations, professional societies, corporate grants, philanthropy, and local institutional support. Each site has pursued and continues to pursue funding from a number of sources.[22]

Three CoEs have turned to the NIH for support of trainees in women's health research, examining existing funding mechanisms that support research training and attempting to fit women's health into these established programs. Although the ORWH is charged with increasing the amount of research in women's health as well as the number of women biomedical investigators, it does not itself fund such proposals. Therefore, funding mechanisms for research training in other institutes were examined. In particular, the National Institutes for Nursing Research (NINR), the National Institute of Aging (NIA), and the National Institute of Child Health and Human Development (NICHD) were viewed as sources of funding for women's health training.[23] Both individual and institutional NRSAs provide the opportunity for salary support for graduate and postgraduate research training.[24] The University of Wisconsin CoE, whose director is a geriatrician, was able to use this mechanism to obtain funding for postdoctoral physician and Ph.D. scientists through the NIA by focusing its proposal on postmenopausal and older women. Magee-Women's Hospital CoE, whose director was a reproductive biologist with a large research program through NICHD, used the NRSA mechanism to fund both predoctoral Ph.D.s and medical students. The UIC CoE director is in the School of Nursing and is seeking funding through NIH.

Even within institutes that would seem to embrace many of the tenets of women's health, the fit is sometimes forced. Although women's health has evolved from a focus on reproduction to a broad multifaceted interdisciplinary field with a life span perspective across the breadth of scientific inquiry within biomedical and behavioral research,[18,19,25] this framework may not be valued by grant reviewers, who typically come from a single discipline. For example, an NICHD review criticized one training grant from a CoE director for having too heavy an emphasis on aging women, and an NIA review criticized a second training grant from the same director for including research on pregnant and reproductive age women. Furthermore, in the traditional model, senior researchers endorse training support for young investigators who will become like them. Cross-disciplinary training is a relatively new concept, which may temper the enthusiasm of grant reviewers who ask, What will this trainee look like at the end of training?

The Department of Veterans Affairs deserves special mention because as a single organization, it funds more advanced training for women

physicians in women's health than any other organization.[26] Women's Health Fellowships are considered special residencies through the Office of Academic Affiliations at the Department of Veterans Affairs. Academic centers with affiliations to Veterans Affairs Medical Centers have this program as a potential mechanism to fund physician trainees. The University of Wisconsin receives such support. The University of Maryland has been able to support its program through corporate gifts and foundations. Because MCP-Hahnemann focused its program on medical students, salary support for trainees was not an issue, and this site was able to develop an elective for medical students who are interested in becoming women's health researchers.

Obtaining administrative support

Separate from salary support for advanced trainees is the issue of administrative support at each site. Although an interdisciplinary framework is believed to be one of the strengths of women's health research, it can also be one of its greatest vulnerabilities in departmentally entrenched academic health sciences centers. The CoE contract can be used to support administrative personnel, but when these contracts terminate, who will provide this support for training in women's health research? Each center struggles with this in its own way, and the future is uncertain. The NIH NRSAs provide a small amount of money to cover training costs for each trainee funded, but they specifically prohibit the inclusion of funds for administrative support. Training grants from NIH also come with only a fraction of the usual percentage for institutional costs, and foundations that support fellowship salaries typically support no institutional overhead costs.

Each CoE dreams of a large endowment that would sustain program costs long term. There is a general feeling among women leaders in academic health sciences that if we could get our message out to woman philanthropists, they would be enthusiastic about supporting training programs for women leaders in academic health sciences. After all, $7 trillion will fall into the hands of baby boomers within the next two decades, and because women not only outlive men but have been increasingly successful in their own right, they control 60% of the nation's wealth.[27] Furthermore, research on women's philanthropy shows that women are much more likely than men to give to a cause to which they feel a personal connection.[27] However, those who prioritize fund-raising initiatives may not themselves value women's health research or the development of more women leaders and, thus, may not present such giving opportunities to women philanthropists capable of making substantive contributions. The CoEs are not able to provide a road map to other institutions on this issue. Committed individuals at each site are a prerequisite, and these individuals must work within and around their unique institutional barriers to try to reach potential philanthropists.

Securing the commitment of mentors

Because many of the potential research mentors for the developing women's health research training programs were already overwhelmed with obligations within their own departments, the CoEs had to find means to entice these individuals to assume additional duties for a new program often outside their department. Specific motivators for collaboration are site specific but might include salary for graduate students or postdoctoral fellows, office help, providing access to a clinical population, volunteering to serve on a committee or give a lecture, or assistance with grants management. The opportunity to work with other women in the context of women's health research was itself seen as a welcome investment of time by some potential mentors. Again, each CoE examined the local strengths and potential obstacles around these issues. The process of developing the research training proposal itself was used by some sites as an ideal opportunity to begin to identify mentors in various departments interested in collaborating. Strategies used by some CoEs to accomplish this have included the following:

- Identifying potential mentors with thriving research programs (typically NIH funded) who either identify themselves as women's health researchers or at least are involved in research that could be called women's health research even if the investigators themselves have not placed their research in that framework (e.g., obesity, osteoporosis, aging);
- Bringing potential research mentors on board as the core faculty for a grant proposal to support a training program with some enticement to the mentors, such as potential salary support for their graduate or postdoctoral trainees;

- Once identified, ensuring that these potential research mentors are part of any information distribution about women's health research activities emanating from the CoE (e.g., e-mail, mailing lists);
- Holding a social event to celebrate submission of the proposal (and of course the success of the proposal) to stimulate a sense of involvement by the selected research mentors in a new initiative; highlighting the new program and its faculty in local newsletters or other media;
- Developing core activities for trainees, such as a regular interdisciplinary women's health research conference with topnotch speakers (including selected mentors).

The goal of this strategy is to ensure that trainees receive mentoring from an established scientist in a specific discipline and, at the same time, are prodded to see their research in the broader context of women's health. It is anticipated that the trainees will bring back to their research mentors new perspectives gained from interaction with others in women's health.

Assuring the effectiveness of cross-disciplinary mentors

Achievements of benchmarks along a timeline that characterize academic success are fairly standard across disciplines. Trainees must demonstrate their ability to perform research through presentation of their work at discipline-specific national meetings and through publication of their research results in peer-reviewed scientific journals. They must demonstrate progressive independence as their research branches from that of their mentor into a new direction. Those programs that use multiple mentors, mentor teams, or cross-disciplinary mentoring will use the same criteria for success. It is too soon to ascertain whether such nontraditional mentoring models will be successful. However, it is noteworthy that the traditional mentorship models have been failing[28] to attract and retain physicians into research careers, resulting in a 30% fall in the number of physician investigator-initiated proposals to the NIH in recent years.[29] Academic medicine needs to investigate new models of mentoring, and women's health research presents an excellent opportunity in this regard.

The effectiveness of a mentor is traditionally measured by the academic success of his or her trainees. Do they ultimately become faculty members at major academic institutions? Are they able to maintain independently funded research programs that contribute substantively to a scientific discipline? The CoE programs will use similar measures of success.

Other challenges

In parallel to the development of research training programs, the CoE also are evaluating and seeking ways to address other obstacles that have traditionally prevented or delayed women's career advancement.[4–11] Such efforts include changing hiring and promotion policies, taking surveys to assess gender climate,[11] assessing salary and promotion according to gender and race, and implementing mentoring programs. They are also working to increase the awareness, in their own institutions and in the greater national academic community, that increasing the diversity of leaders in academic health sciences will have a positive impact on the future of medical schools, other health science schools, biomedical and behavioral research, and healthcare in the United States.

EVALUATION

A critical element in evaluating the success of the women's health research training programs will be the ability of each CoE to obtain resources to launch and sustain the developing initiatives. Beyond this, the success of the training programs must be evaluated against the stated goal of developing more women leaders in academic health sciences. The CoE programs are too new to evaluate this outcome. Summative information will be collected, including the number of applicants and participants in each program and their home disciplines. The career destinations of the trainees will be monitored and examined for the number of trainees who continue in research and who go on to become independent investigators.

All the CoE sites, but particularly the last six sites designated in 1998, are instructed to address specifically within their leadership plan the unique challenges and mentoring needs faced by women faculty and trainees from traditionally underrepresented groups, including racial and ethnic minority populations.[30] There is a sincere commitment to address these issues on the part

of OWH and at the individual CoE sites, although no additional resources within the CoE contract are earmarked for this effort. Those sites seeking NIH funding to support trainees must demonstrate concerted efforts to recruit a diverse group of trainees. It is too early to evaluate the success of these efforts at individual CoEs.

CONCLUSIONS

Advancing women's health and developing women leaders in academic health sciences are interrelated. The OWH has charged its CoEs to develop strategies for developing such leaders. Because research is the pathway to leadership in academic environments, any successful leadership plan must incorporate research training. We have described here models developed at five CoEs for increasing awareness of and competency in women's health research. Each site has chosen a different model and targeted trainees at different levels ranging from undergraduate medical students to faculty. We have described some of the challenges for development and maintenance of these programs. Evaluation of success will include traditional measures, such as the number of trainees who publish or obtain extramural research funding. Less tangible outcomes will be more difficult to capture, but the very existence of these programs will promote a general increased awareness of the need for researchers to ask sex-based and gender-based questions. Furthermore, the struggle at each site to accrue resources to initiate and sustain these programs heightens the awareness of the need for federal funding mechanisms that better fit the evolving paradigm of women's health research than those that currently exist.

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